

What is claimed is:

1. A rare-earth sintered magnet of a composition of $(R1_x + R2_y)T_{100-x-y-z}Q_z$, where R1 is at least one element selected from the group consisting of all rare-earth elements excluding La, Y and Sc, R2 is at least one element selected from the group consisting of La, Y and Sc, T is at least one element selected from the group consisting of all transition elements, and Q is at least one element selected from the group consisting of B and C, and comprising a crystal grain of an $Nd_2Fe_{14}B$ type compound as a main phase, wherein:

molar fractions x, y and z satisfy

$8 \leq x \leq 18 \text{ at\%}$,

$0.1 \leq y \leq 3.5 \text{ at\%}$ and

$3 \leq z \leq 20 \text{ at\%}$, respectively; and

a concentration of R2 is higher in at least a part of a grain boundary phase than in the crystal grain.

2. The rare-earth sintered magnet according to claim 1, wherein the molar fractions x and y satisfy $0.01 \leq y/(x+y) \leq 0.23$.

3. The rare-earth sintered magnet according to claim 1, wherein R2 includes at least Y.

4. The rare-earth sintered magnet according to claim 1, wherein an amount of oxygen is in a range of 2000 ppm to 8000 ppm by weight.

5. A method of producing a rare-earth sintered magnet, comprising the steps of:

preparing a powder of a rare-earth alloy having a composition of $(R1_x + R2_y)T_{100-x-y-z}Q_z$ where R1 is at least one element selected from the group consisting of all rare-earth elements excluding La, Y and Sc; R2 is at least one element selected from the group consisting of La, Y and Sc; T is at least one element selected from the group consisting of all transition elements; and Q is at least one element selected from the group consisting of B and C, wherein molar fractions x, y and z satisfy $8 \leq x \leq 18$ at%, $0.1 \leq y \leq 3.5$ at% and $3 \leq z \leq 20$ at%, respectively; and

sintering the rare-earth alloy powder,

wherein R2 existing in a main phase crystal grain of an $Nd_2Fe_{14}B$ crystalline structure in the rare-earth alloy before sintering is diffused into a grain boundary phase in the sin-

tering step, whereby a concentration of R2 is higher in at least a part of the grain boundary phase than in the crystal grain.

6. The method of producing a rare-earth sintered magnet according to claim 5, wherein an amount of oxygen included in the rare-earth alloy powder is in a range of 2000 ppm by weight to 8000 ppm by weight.

7. The method of producing a rare-earth sintered magnet according to claim 5, wherein R1 existing in the grain boundary phase in the rare-earth alloy before sintering is diffused into the main phase crystal grain during the sintering step.

8. The method of producing a rare-earth sintered magnet according to claim 5, wherein an oxide of R2 is formed in the grain boundary phase during the sintering step.

9. The method of producing a rare-earth sintered magnet according to claim 5, wherein the sintering step comprises a first step of maintaining the rare-earth alloy powder at a temperature in a range of 650 to 1000°C for 10 to 240 minutes, and a

second step of further sintering the rare-earth alloy powder at a temperature higher than that used in the first step.

10. The method of producing a rare-earth sintered magnet according to claim 5, wherein the rare-earth alloy powder is obtained through pulverization in a gas whose oxygen concentration is controlled.

11. The method of producing a rare-earth sintered magnet according to claim 5, wherein the rare-earth alloy powder is obtained through pulverization in a gas whose oxygen concentration is controlled to be 20000 ppm or less.

12. The method of producing a rare-earth sintered magnet according to claim 5, wherein an average particle diameter (FSSS particle size) of the rare-earth alloy powder is 5 μm or less.

13. A rare-earth sintered magnet, having a composition of $(R1_x + R2_y)(T1_p + T2_q)_{100-x-y-z-r}Q_zM_r$ where R1 is at least one element selected from the group consisting of all rare-earth elements excluding La, Y and Sc, R2 is at least one element selected from the group consisting of La, Y and Sc; T1 is Fe, T2 is at least one

element selected from the group consisting of all transition elements excluding Fe, Q is at least one element selected from the group consisting of B and C, and M is at least one element selected from the group consisting of Al, Ga, Sn and In, and comprising a crystal grain of an $\text{Nd}_2\text{Fe}_{14}\text{B}$ type compound as a main phase, wherein:

molar fractions x, y, z, p, q and r satisfy

$$8 \leq x+y \leq 18 \text{ at\%},$$

$$0 < y \leq 4 \text{ at\%},$$

$$3 \leq z \leq 20 \text{ at\%},$$

$$0 < q \leq 20 \text{ at\%},$$

$$0 \leq q/(p+q) \leq 0.3 \text{ at\% and}$$

$$0 \leq r \leq 3 \text{ at\%, respectively; and}$$

a concentration of R2 is higher in at least a part of a grain boundary phase than in the crystal grain.

14. The rare-earth sintered magnet according to claim 13, wherein the molar fraction y satisfies $0.5 < y \leq 3 \text{ at\%}$.

15. The rare-earth sintered magnet according to claim 13, wherein R2 includes at least Y.

16. The rare-earth sintered magnet according to claim 13, wherein T2 includes at least Co.

17. The rare-earth sintered magnet according to claim 13, wherein an amount of oxygen is present in a range of 2000 ppm by weight to 8000 ppm by weight.

18. A method of producing a rare-earth sintered magnet, comprising the steps of:

preparing a powder of a rare-earth alloy having a composition of $(R1_x + R2_y)(T1_p + T2_q)_{100-x-y-z-r}Q_zM_r$, where R1 is at least one element selected from the group consisting of all rare-earth elements excluding La, Y and Sc, R2 is at least one element selected from the group consisting of La, Y and Sc; T1 is Fe, T2 is at least one element selected from the group consisting of all transition elements excluding Fe, Q is at least one element selected from the group consisting of B and C, and M is at least one element selected from the group consisting of Al, Ga, Sn and In), and comprising, as a main phase, a crystal grain of an $Nd_2Fe_{14}B$ crystalline structure, wherein:

molar fractions x, y, z, p, q and r satisfy

$8 \leq x+y \leq 18$ at%,

$0 < y \leq 4 \text{ at\%}$,

$3 \leq z \leq 20 \text{ at\%}$,

$0 < q \leq 20 \text{ at\%}$,

$0 \leq q/(p+q) \leq 0.3 \text{ at\%}$ and

$0 \leq r \leq 3 \text{ at\%}$, respectively; and

sintering the rare-earth alloy powder,

wherein R2 existing in the main phase crystal grain of the $\text{Nd}_2\text{Fe}_{14}\text{B}$ crystalline structure in the rare-earth alloy before sintering is diffused into a grain boundary phase in the sintering step, whereby a concentration of R2 is higher in at least a part of the grain boundary phase than in the crystal grain.

19. The method of producing a rare-earth sintered magnet according to claim 18, wherein an amount of oxygen included in the rare-earth alloy powder is in a range of 2000 ppm by weight to 8000 ppm by weight.

20. The method of producing a rare-earth sintered magnet according to claim 18, wherein R1 existing in the grain boundary phase in the rare-earth alloy before sintering is diffused into the main phase crystal grain during the sintering step.

21. The method of producing a rare-earth sintered magnet according to claim 18, wherein an oxide of R2 is formed in the grain boundary phase in the sintering step.

22. The method of producing a rare-earth sintered magnet according to claim 18, wherein the sintering step comprises a first step of maintaining the rare-earth alloy powder at a temperature in a range of 650 to 1000°C for 10 to 240 minutes, and a second step of further sintering the rare-earth alloy powder at a temperature higher than that used in the first step.

23. The method of producing a rare-earth sintered magnet according to claim 18, wherein the rare-earth alloy powder is obtained through pulverization in a gas whose oxygen concentration is controlled.

24. The method of producing a rare-earth sintered magnet according to claim 18, wherein the rare-earth alloy powder is obtained through pulverization in a gas whose oxygen concentration is controlled to be 20000 ppm or less.

25. The method of producing a rare-earth sintered magnet according to claim 18, wherein an average particle diameter (FSSS particle size) of the rare-earth alloy powder is 5 μm or less.